Statistics Norway,
Research Department,
Lasse Sigbjørn Stambøl,
10.6.2011

Higher education institutions, regional labour markets and population development

By

Lasse Sigbjørn Stambøl

Research Department, Statistics Norway, Box 8131 Dep, 0033 Oslo, Norway

Abstract. This paper introduces a short description of the Norwegian regional higher education institution system, followed by some analyses of the impact of higher education institutions on regional labour markets, labour and job mobility and population development featuring e.g. studies of the students' post graduate regional mobility, regional variation in the field of higher education and the regional ability of students to complete their graduation.

Most of the analyses are based on data from individual registers covering the entire population, and partly organised as regional panel data.

The findings suggest that regions that contain both university and colleges perform better than average on most indicators being analysed; especially, the ability to increase the number of higher educated labour, the return to the net increase of professionals at the higher education institutions on the numbers of regional higher educated labour, the ability to re-allocate jobs within firms from low to higher education jobs, higher population growth, higher than average net in-migration of population due to relatively low out-migration and stronger import of knowledge through in-migration than export of knowledge through out-migration, thus experiencing a strong regional "brain-gain".

Furthermore, the regions where the higher education institute itself represents a minor part of the local higher educated labour market perform mostly better than those regions where the higher education institution itself represents a medium or large part of the local higher educated labour market. Finally, the regions without higher education institutions mostly perform worse than average on most indicators, except the ability to create new jobs in new established firms. However, these regions also show higher than average closures of firms generally.

Slettet: s

E-mail: Corresponding author: lasse.sigbjorn.stambol@ssb.no

To be presented at the 51th Congress of the European Regional Science Association in Barcelona, Catalan, Spain, 30. August–3. September 2011

1. Background

This paper introduces a short description of the Norwegian regional higher education institution system, followed by some analyses of the impact of higher education institutions on regional labour markets, labour and job mobility and population development featuring e.g. studies of the students' post graduate regional mobility, regional variation in the field of higher education and the regional ability of students to complete their graduation.

Higher education originally developed in Norway in order to create a more educated work force. This was the prime mission of the first university, the University of Oslo, established in 1811. In the 1960s and 1970s, higher education institutions began to differentiate themselves. A binary system was the solution to the quantity versus quality problem. District colleges served vocational needs, and universities maintained a traditional focus.

The higher education system in Norway has been continuously reformed over the last decades. This reform process started at the end of the 1980s, when many politicians seemed to regard universities and colleges as slowly adapting institutions with little ability to adjust to new social needs. The general discontent led to the establishment of a governmental commission set up in 1987 to evaluate the goals, organisation and priorities of higher education towards the years 2000–2010 (NOU 1988: 28). The outcome of this process was a major reorganisation of this sector in 1994.A formal binary system was established through the merging of 98 vocationally-oriented institutions into 26 state colleges. The majority of these new institutions are multi-disciplinary and multi-programme colleges encompassing the previous specialist colleges of teacher training, engineering, health education, and social work, as well as the district colleges and various other institutions offering a specialist range of teaching programmes.

In 1995 a new Act on Universities and Colleges was approved by Parliament, and, since 1996, all public higher education institutions have been under the same act. Until 1989, most universities and specialized university institutions were regulated by separate acts, while the non-university higher education institutions were guided by governmental or ministerial regulations. Within the non-university sector, only teacher training was regulated by law. In 1989, Parliament passed an act covering all institutions in the university sector. By and large this act gave more autonomy to the universities by delegating decision-making authority on a number of issues. This process of making higher education institutions more responsible for the results of their activities was extended in the 1995 Act and in amendments to this Act in 2002. This process of delegation from the state to the higher education institutions was continued by the 2005 parliamentary approval of a new act on universities and colleges, both public and private.

The higher education system is, however, essentially state-owned. University teachers are civil servants, and in fact, the Parliament is responsible for establishing any new professorships. A high degree of autonomy exists, and academic institutions are important regional forces, but their budgets are fully controlled by the government. About 25 percent of all of the research and development done in Norway is undertaken by higher education institutions. Most of this is basic research and occurs at universities, but applied research and development has proliferated at district colleges in recent years.

At the entrances to the year of 2011 the higher education in Norway is offered by a range of eight universities, nine specialised universities, 24 university colleges as well as a range of private university colleges. The national higher education system is in accordance with the Bologna process, with bachelor's degrees (*first cycle*, three years), master's degrees (*second cycle*, two years) and doctoral degrees (*third cycle*, three years). Acceptance is offered after finishing upper secondary school with general university admissions certification.

The universities and specialised universities are mostly to be found in the main central cities and regions, while the regional higher education system is mostly to be found among the colleges.

2. Hypotheses, data and methods

This paper includes results from considerations and investigations prepared for a public commission appointed by the Norwegian government to promote cross-country growth in skill-intensive jobs (NOU 2011:3). The committee put forward requests and hypotheses considering effects of the Norwegian regional higher education institution system concerning the regional labour market development generally and high qualified jobs in the college regions especially, the function of regional gross job and labour mobility and regional population development with special focus on migration and knowledge spill over through the migration processes. Specific requests were also put forward considering convergence versus divergence in the development of the field of education structure across the universities and colleges, and finally an eventual verification of the hypotheses if students become more quickly graduated in the central regions compared to other college regions.

Part of the analyses are based on data from individual registers covering the entire population, and partly organised as regional panel data. However, in most of the analyses are used descriptive statistics, although based on unique sets of variables for presenting indicators that illuminate the regional labour market growth, job and labour marked mobility and population development by education. Finally, we have used some simple deviation and regression techniques to illustrate changes in the field of education structure among students and high-educated employees in the regional labour markets and some measures illuminating the efficiency of the students' graduation. The use of data and methodology is described in each subsection below. However, first it is important to describe how we have divided the higher education institutions by regional classifications.

3. Regional division by categories of regions

The measures of the regional dimension follow basically a regional classification used by Statistics Norway, and consists of altogether 89 economic regions mainly defined on the base of commuting figures, although not crossing any administrative regions at the county level ((see e.g. Hustoft et al. (1999)). These regions are further classified and aggregated according to their elements of higher education institutions. We found that just above half of these regions have elements of higher education institutions, while the other regions have neither universities nor colleges. However, some of the regions showing elements of higher education institutions include only small sub-divisions of the university colleges. In the main classification of categories of regions we have taken the size of the higher education institutions into consideration, and operate at the most aggregated regional level with five categories of regions, which are as follows:

Category A: Regions that include both universities and colleges.
Category B: Regions that include university colleges, where the high educated staff at the colleges represent a small share (< 2 percent) of the total number of high educated employed.
Category C: Regions that include university colleges, where the high educated staff at the colleges represent an intermediate share (2-5 percent) of the total number of high educated employed.
Category D: Regions that include university colleges, where the high educated staff at the colleges represent a large share (> 5 percent) of the total number of higher educated employed.
Category E: Remaining regions mainly without universities and colleges.

This classification reflects a certain central-peripheral division of regions, where category (A) represents the most central regions, category (B) and partly (C) represent regions with a more compounded labour markets for higher educated labour, while category (D) represents regions with a somewhat smaller labour markets for higher educated labour. Category (E) represents the more peripheral types of regions. A basic idea of the analyses is to use category (A) and (E) as references for different performances of the college regions, recognized by the categories (B), (C) and (D).

However, we operate in addition in parts of the analyses with a central-peripheral division of seven typologies of regions, where the higher education institutions are distributed within this scale of centrality.

4. Universities, colleges and regional labour markets

A central motivation to establish and develop higher education institutions across the regions is the basic function to stimulate regional labour markets to become most adapted to a high educated labour force, give rise to establishments of new firms and further development of high education jobs, and satisfy the regional demand of skilled labour. The expectation is that regional establishment of university and colleges will contribute to the political aim of a conservation of the previous and current regional settlement pattern by improving the regions' ability to develop working places for high educated labour.

In the next sections we thus present some indicators that illuminate different parts of the development in the regional labour markets and population in the years that follows the introduction of the national college system in 1994.

4.1. Distribution of students by regions in 1994 and 2005.

Table 1 shows the distributions of all students in Norway in 1994 and 2005 by regional categories of university and college regions. The figures are first given for the regions including both universities and colleges, while the figures for the college regions follows the classification of categories of regions described in section 2 above. The first category of college regions (B) is those regions where the high educated staff at the colleges represents a small part of the total local high educated employment. In college regions (C) the high educated staff at the colleges represents an intermediate share of the total local high educated employees, while in the third category of college regions (D) the high educated staff at the colleges represent a high share of the total high educated employment. As a reference

category of regions, we also include some results from regions without any university or colleges, category (E).

In the first section of table 1 the distribution is calculated by the regional localisation of the higher education institutions, while in the second section the students are distributed by their formal region of settlement. Many students do not formally migrate to their place of study, but keep their previous addresses, mostly representing their parents' place of living.

This deviation is strongly visible in table 1, showing much stronger centralisation in the place of study compared to the students' regional settlement pattern. Approximately ¾ of the entire student mass are studying in the most central regions that include both universities and colleges, while only half of all students are formally settled in these regions.

There is, however, observed a slight regional divergence in places of study from 1994 to 2005. Alongside political wishes of a regional decentralisation of the college system, the more central university and college regions lost their share of Norway's total number of student places by approximately 2 percent point during this eleven years period. There are the regions where the colleges represent a minor or intermediate part of the total high educated labour that mostly gained new places of study during this period.

On the other hand, the regional settlement pattern of students show a slight increased centralisation from 1994 to 2005, when the university and college regions increased their share of settled students from just below, to just above 50 per cent of the entire mass of students. As observed from table 1 it is the regions without universities and colleges that mostly lost their settled students in this period.

Table1.The distribution of students in Norway by categories of regions in 1994 and 2005.By place of study and place of living.

Categories of regions:	The share of students at the higher education institutions in 1994 by place of study	The share of students at the higher education institutions in 2005 by place of study	Changes in the share of students at the higher education institution 1994-2005 by place of study	The share of students at the higher education institutions in 1994 by place of living	The share of students at the higher education institutions in 2005 by place of living	Changes in the share of students at the higher education institutions 1994-2005 by place of living
Norway	100	100	0	100	100	0
University and colleges (A)	74.2	72.4	-1.8	48.2	50.6	2.4
Colleges (B)*	5.2	6.1	0.9	14.1	14.0	-0.1
Colleges (C)*	12.3	13.2	0.9	16.3	15.5	-0.8
Colleges (D)*	8.3	8.3	0.0	3.7	3.6	-0.1
None colleges (E)				17.6	16.3	-1.3

*** College regions are classified by the percentage high-educated staff at the higher education institutions represents of the total number of high-educated employed in by the following intervals: (B) 0,3 – 2 per cent, (C) 2-5 per cent, (D) more than 5 per cent.**

4.2. Regional distributions of higher educated employed within and outside of higher education institutions

Table 2 presents an overview of the development of the regional share of the nations' total professional employment at universities and colleges in 1994 and 2005. These results are compared with the development of the regional share of the nations' total employment with

higher education correspondingly. As a reference we also here includes the change of high educated employees in the category (E) of regions without higher education institutions.

Beyond the national figures, expressed by an index set at 100 per cent, there were observed an increase of professionals at the higher education institutions at approximately 80 per cent from 1994 to 2005. Change in the number of high educated employees generally was approximately 55 per cent during the same period.

It has been a clear regional change of professionals at the higher education institutions where the university and college regions reduced their share of professionals by 4.7 percent point from 1994 to 2005, while the strongest increase was observed in the second category of college regions (C).

It is important to note that the regional change of employed with higher education is opposite to the change of professionals at the higher education institutions. In spite of a clear reduction of the share of professionals at the higher education institutions, the university and college regions experienced an increase in the share of employed with higher education generally. It is, however, interesting to note that the college regions that experienced the strongest growth of professionals at the higher education institutions are those regions that experienced the strongest reduction of the share of high educated employees generally. This might indicate that the return to net increase of professionals at the higher education institutions on the numbers of regional high educated labour is lower in the college regions than in central regions that include both universities and colleges. It is, however, important to note that the strongest reduction in the share of high educated employees was to be found in the regions without any university and colleges, with a reduction of 0.9 percent points from 1994 to 2005. This indicates that even the weakest performing college regions develop better than the average for all regions without any university and colleges considering the growth of high educated labour generally.

Table 2: The regional distribution of high educated employees at higher education institutions and high educated labour generally in 1994 and 2005. Categories of regions by place of work.

Categories of regions:	The share of high educated employment at the higher education institutes in 1994	The share of high educated employment at the higher education institutes in 2005	Changes in the share of high educated employment at the higher education institutes 1994-2005	The share of total high educated employment in 1994	The share of total high educated employment in 2005	Changes in the share of total high educated employment 1994-2005
Norway	100	100	0	100	100	0
University and colleges A)	82.7	78.0	- 4.7	54.4	56.4	2.0
Colleges (B)*	4.2	4.1	- 0.1	12.6	12.5	- 0.1
Colleges (C)*	7.0	12.0	5.0	15.9	15.5	- 0.4
Colleges (D)*	5.4	5.7	0.3	2.9	2.7	- 0.2
None colleges (E)	(0.7)	(0.2)	(-0.5)	13.3	12.4	- 0.9

*** See notes in table 1**

4.3. Regional development of employment after the change of millennium

Table 3 shows the development of the regional employment in the new millennium both considering the employment generally and distributed by those with and without high education. The increases of employment for high educated employees in the entire nation has

been approximately three times stronger than for the employment generally, and approximately ten times stronger compared to the employment growth of persons without high education.

Table3. Change of employment by categories of regions 2000-2009. Total number of employed that is further distributed by employed with and without higher education by place of work.

	Total Employment		Employed without higher education		Emloyed with higher education	
Categories of regions:	Changes 2000-2009	Deviation from the national average in per cent points	Changes 2000-2009	Deviation from the national average in per cent points	Changes 2000-2009	Deviation from the national average in per cent points
Norway	10.4	0	3.0	0	31.0	0
University and colleges (A)	17.1	6.7	8.5	5.5	37.7	6.8
Colleges (B)*	10.8	0.5	3.9	0.9	36.7	5.7
Colleges (C)*	8.7	-1.7	2.0	-1.0	30.6	-0.4
Colleges (D)*	5.8	-4.5	-0.8	-3.8	27.8	-3.1
None colleges (E)	4.1	-6.3	-0.8	-3.8	26.0	-4.9

*** See notes in table 1**

It is still the regions with both universities and colleges that experienced the strongest employment growth, both considering the employment with and without higher education. This also indicates that where the employment growth is strongest for high educated employees, most new jobs are also established for persons without higher education. This pattern is visible downwards the hierarchy of college regions, where the most compound college regions are those regions performing closest to the employment growth of the university and college regions, while the college regions where the college represents a high share of the total high educated labour shows weaker employment growth than all other categories of college regions. However, all college regions show better employment growth than regions without any colleges, and mostly then considering employed with higher education.

4.4. Gross re-allocations of employment

In this section we show some labour mobility results by decomposing all gross mobility of persons and jobs in the regional labour markets from 2004 to 2005. Table 4a indicates thus the gross allocations and re-allocations of job and flows of labour beyond the net employment change by regions of work 2004-2005. Altogether regions with both university and colleges show the strongest increase of employees also in this period. The other college regions have moderate changes of employment while regions without colleges experienced an employment decrease.

The regions including both university and colleges show, however, both higher exits from jobs and higher entries to jobs than other categories of regions, thus experiencing stronger labour mobility than other categories of regions.

It is, however, small deviation between the regions concerning the extent of losses of jobs within firms that reduce their employment, with a somewhat higher percentage in regions where the high educated staff at the college itself represents a high share of the total high educated employment. The percentage of employees that become hit by closures of entire

firms is rather equal across regions with higher education institutions, but highest in regions without universities and colleges.

Table 4a. Gross re-allocation of employment 2004-2005 by categories of regions. Percent of employment in 2004. Un-weighted average.

Categories of regions:	1) Em-ployed 2004	2) Total exits	3) Due to: Losses of jobs within firms	4) Due to: Clo-sures of firms	5) Due to: Other types of exits	6) Total en-tries	7) Due to: job growth within firms	8) Due to: new estab-lished firms	9) Due to: Other types of en-tries	10) Employ-ment 2005 (2004= 100)
Norway	100,0	25.8	9.2	2.8	13.7	26.9	7.7	5.5	13.7	101.2
University and colleges (A)	100,0	27.1	9.3	2.8	15.0	28.9	8.5	5.9	14.5	101.9
Colleges (B)*	100,0	25.8	9.3	2.9	13.6	26.2	7.1	5.8	13.3	100.4
Colleges (C)*	100,0	25.4	9.7	2.8	12.9	25.4	7.3	5.6	12.4	100.0
Colleges (D)*	100,0	25.5	9.6	2.7	13.2	25.8	8.2	5.0	12.7	100.3
None colleges (E)	100,0	25.6	9.2	3.5	12.9	25.4	7.3	5.9	12.3	99.8

*** See notes in table 1**

Considering the job-recruitment processes, the job growth within firms that increase their employment is strongest in the regions that includes both universities and colleges and in the college regions where the college itself represents a high share of the high educated employment, while there are small deviations across the other regional categories. Strongest job growth due to new established firms is to be found in the regions that include both universities and colleges and in regions without any university or colleges, but lowest in college regions where the colleges represent a higher share of the total local high educated labour.

Table 4b shows results for gross allocations and re-allocations of employed with higher education correspondingly. The results are presented in two rows for each category of regions, where the first rows show results for employed with higher education generally, while the second rows show the results of high educated persons without the high educated staff at the higher education institutions.

The exits from jobs and especially the entries to jobs are also here highest in the regional category that includes both universities and colleges. There are, however, small deviations between the two rows, although a tendency to a slightly higher mobility when we exclude the high educated staff at the higher education institutions.

The reduction of jobs within firms that reduce their employment are highest in regions with both universities and colleges, and in college regions where the high educated staff represent a high share of the total high educated employment. Lowest gross reduction of jobs is to be found in the college regions where the college itself represents an intermediate share of the high educated employment. The share of employees that is hit by firm closures are most pronounced in regions without university or colleges, but almost as high in the college regions where the staff of the college represents a high share of the high educated employment, and especially when we exclude this staff in the results. Even if the deviation in firm closures don't vary strongly across the regions, the lowest share of firm closures were to be found in the university and college regions.

Table 4b. Gross re-allocation of employment 2004-2005 by categories of regions. Employed with higher education (row 1) and employed with higher education except high educated employees at the higher education institutions. Percent of the employment in 2004. Un-weighted average.

Categories of regions:	1) Em-ployed 2004	2) Total Exits	3) Due to: Losses of jobs within firms	4) Due to: Clo-sures of firms	5) Due to: Other types of exits	6) Total enters	7) Due to: job growth within firms	8) Due to: new estab-lished firms	9) Due to: Other types of entries	10) Employ-ment 2005 (2004= 100)
Norway	100,0	23.3	7.2	3.6	12.6	26.3	7.9	6.2	12.2	102.9
	100,0	23.5	7.3	3.8	12.4	26.4	7.9	6.4	12.1	102.9
University and colleges (A)	100,0	24.7	8.3	3.6	12.8	27.8	8.7	6.7	12.4	103.1
	100,0	25.0	8.6	3.8	12.6	28.0	8.8	7.0	12.2	103.0
Colleges (B)*	100,0	22.9	7.7	3.7	11.5	25.3	7.2	6.9	11.2	102.4
	100,0	23.0	7.7	3.8	11.5	25.4	7.3	7.0	11.1	102.4
Colleges (C)*	100,0	22.0	7.3	3.8	10.9	24.6	7.6	6.4	10.6	102.6
	100,0	22.0	7.4	3.8	10.8	24.7	7.6	6.6	10.5	102.7
Colleges (D)*	100,0	24.3	7.8	3.9	12.6	26.8	8.1	7.1	11.6	102.5
	100,0	25.0	8.3	4.4	12.3	27.4	8.3	7.7	11.4	102.4
None colleges (E)	100,0	23.5	7.9	4.7	10.9	25.2	7.5	7.5	10.2	101.7
	100,0	23.5	7.9	4.7	10.9	25.2	7.5	7.5	10.2	101.7

*** See notes in table 1**

Considering the job growth within firms that increase their employment it is also regions with both universities and colleges that show the highest figures followed by the college regions where the high educated staff at the colleges represents the highest share of the local high educated employees, while the deviation across the other regional categories are negligible, although lowest growth rates in college regions where the high educated staff at the colleges represents a minor part of the high educated employment. Job growth due to new established firms is highest in the college regions where the high educated staff at the colleges represents a high share of the local high educated employment and in regions without any university or high schools. An important explanation is to be found in a strong growth of new established self-employment in peripheral regions due to lack of wage jobs (se Stambøl 2007, 2009). However, these peripheral regions also experienced the highest rates of firm closures. The deviation of new established firms across the other categories of regions are rather small, but somewhat lower in the college regions where the staff at the colleges represents an intermediate share of the local high educated employment.

4.5. Migration, mobility and education level

In table 5a and 5b we include some results that show the population change, the gross and net migration and the average level of education in the population, measured by the average number of years all persons 25-60 years of age have been in formal education. In the same manner we have also measured ”brain-gain” or ”brain-drain” through the migration processes, by comparing the average level of education among in-migrants (brain-gain) with the average level of education among out-migrants (brain-drain).

In table 5a we show the results for the entire population in the age group 25-60 years, except students in the same age group that were not employed. The exclusion of students is to

indicate how the population performs in the years of post-graduation. Table 5b explores similar results, but concentrated to persons with higher education. All results are made as annual weighted averages during the period of 2000-2005.

The regions that include both universities and colleges show highest values for almost all variables considering the total population (table 5a). This means higher population growth, higher values for both gross in-migration and gross out-migration, although also highest net in-migration. Furthermore, the average education level of the population is clearly higher than in other categories of regions, and the supply of knowledge through in-migration is significantly higher than the export of knowledge through out-migration.

The college regions where the high educated staff at the colleges represent a minor part of the total local high educated employment perform also well considering the population growth and migration balances, but show somewhat lower education level of the population and loose knowledge through the migration processes due to somewhat higher average education level of out-migrants compared to in-migrants.

All other regional categories, including regions without colleges, show all weaker population growth, negative migration balances, lower than average level of education of the population and losses of knowledge trough the migration processes. Strongest loss of knowledge trough migration is to be found in the college regions where the high educated staff at the colleges represents a high share of the local high educated employment. Lowest level of education in the population is, however, to be found in the regions without universities and colleges.

Table 5a: Population change, average migration rates per 1000 inhabitants and average education level based on the number of years in education in the age group 25-60 years. Weighted average in the period of 2000-2005. Categories of regions by place of living (without students that are not employed).

	Population change	**Migration rates per 1000 persons in the age group 25-60 years**			**Level of education INDEX: Average level of education of the population 25-60 years in Norway =100**		
Categories of regions:	**2000-2005**	**Gross in-migration**	**Gross out-migration**	**Net in-migration**	**Total population**	**In-migrants**	**Out-migrants**
Norway	**3.5**	**27.68**	**27.68**	**0.00**	**100.00**	**106.12**	**106.12**
University and colleges (A)	**5.6**	**34.26**	**31.22**	**3.05**	**102.16**	**108.20**	**106.60**
Colleges (B)*	**3.2**	**25.29**	**23.80**	**1.48**	**97.51**	**103.80**	**104.63**
Colleges (C)*	**1.9**	**22.01**	**24.61**	**-2.60**	**98.69**	**105.37**	**106.68**
Colleges (D)*	**2.4**	**25.55**	**27.19**	**-1.64**	**98.22**	**104.77**	**107.21**
None colleges E)	**0.6**	**25.80**	**28.87**	**-3.07**	**96.38**	**102.21**	**104.10**

*** See notes in table 1**

When we concentrate the results only for persons that have completed a higher education, the migration balances become strengthen for regions that include both universities and colleges (se table 5b). Regions where the high educated staff at the colleges represents less than 2 percent of the total local high educated employment, are close to balance in net-migration of high educated persons, although with a slight negative migration balance. All other regional categories, and especially the regions without any university or colleges, show all a significant loss of high educated persons through migration. As the results clearly indicate, it

is the gross out-migration that creates the strongest regional deviation in migration between the central university and college regions and the other college regions and regions without university and colleges. The gross in-migration rates are more evenly distributed across the different categories of regions.

Considering the level of education, there are small regional deviations both in the average level of education among high educated persons as well as between in- and out-migrants with higher education. So even when the high educated persons are clearly sub-represented in more peripheral regions, the average level of education of the high educated persons living in those regions do not deviate much from the average education level of high educated persons in the other categories of regions, thus also neither from the national average.

Table 5b: Population change, average migration rates per 1000 inhabitants in the age group 25-60 years with higher education and average education level among persons with higher education based on the number of years in education. Weighted average in the period 2000-2005. Categories of regions by place of living (without students that are not employed).

	Population change	**Migration rates per 1000 persons in the age group 25-60 years with higher education**			**Level of education INDEX: Average level of education of the population 25-60 years with higher education in Norway =100**		
Categories of regions:	**2000-2005**	**Gross in-migration**	**Gross out-migration**	**Net in-migration**	**Total population**	**In-migrants**	**Out-migrants**
Norway	**16.2**	**39.59**	**39.59**	**0.00**	**100.00**	**100.57**	**100.57**
University and colleges (A)	**16.4**	**44.97**	**38.87**	**6.10**	**100.38**	**100.76**	**100.52**
Colleges (B)*	**17.3**	**37.55**	**38.32**	**-0.77**	**99.00**	**100.54**	**100.18**
Colleges (C)*	**16.1**	**33.22**	**39.85**	**-6.63**	**99.33**	**100.89**	**100.77**
Colleges (D)*	**17.4**	**38.06**	**46.60**	**-8.55**	**99.91**	**100.88**	**100.89**
None colleges E)	**14.6**	**40.13**	**50.01**	**-9.88**	**99.13**	**100.40**	**100.41**

*** See notes in table**

4.6. Post-graduate settlement and migration among students

In this section we have distributed all students in Norway in 1994 by their place of study and their place of living. Then we follow these students to the year of 2000 and further to the year of 2005 for to investigate the share of all students in 1994 that are still living in their region of study in 2000 and 2005 respectively. The students are distributed by two main groups, where the first group consists of all students that where both studying and living in their region of study in 1994, while the second group consists of all students that were not living in their region of study in 1994.

As we could expect, it is the first group of students that shows the highest ability to become settled in their region of study in the years of post-graduation, although a minor share of students that were not settled in their region of study choose to migrate to their region of study after finishing their studies (see table 6).

Among students that were both studying and living in their region of studies, approximately 78 and 74 per cent were still living in their regions of study six and eleven years after the observation year of study, respectively. While the percentage of this group is slightly shrinking by time, the percentage of students that were not living, but later on migrating to

their region of study, was slightly increasing from 16.2 per cent in the year of 2000 to 16.9 per cent in the year of 2005.

The category of region that includes both university and colleges shows the highest ability to keep their settled students as well as to attract their other students after their completion of study. On the other hand, the college regions were the staff at the college itself represents a high share of the total local high educated employment, experienced the lowest ability to keep their settled students after study as well as weak ability to attract their none-settled students in the years that follow their period of study.

Table 6. Students in 1994 that were still living in their region of study in 2000 and 2005 distributed by place of study and place of living and by categories of regions.

	All students in 1994 that were both studying and living in their region of study. (Index = 100)		All students in 1994 that were studying but not living in their region of study. (Index = 100)	
Categories of regions:	The percentage still living in the region of study in 2000	The percentage still living in the region of study in 2005	The percentage still living in the region of study in 2000	The percentage still living in the region of study in 2005
Norway	78.2	74.1	16.2	16.9
University and colleges	79.7	75.6	22.4	23.5
Colleges (B)*	77.2	73.8	7.8	7.8
Colleges (C)*	71.2	67.4	6.0	5.8
Colleges (D)*	64.4	60.3	2.9	2.9

*** See notes in table 1**

5. Field of education structure

5.1. Field of education structure of students by higher education institution regions

In this section we have distributed all students in Norway in 1994 and 2005 by their region of study. All students are further distributed by their higher education by field of education, which then define the field of education structure of all universities and colleges, which are further aggregated by higher education institution regions, included the national average.

Table 7. Students distributed by their fields of education in 1994 and 2005. Categories of regions.

Categories of regions:	Years	Humanities and arts	Education	Social sciences and law	Business and administration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communications, safety and security
Norway	1994	17.7	17.0	13.6	14.8	18.3	15.0	0.9	2.7
	2005	13.7	14.2	13.4	18.9	15.8	22.0	0.6	1.4
University and colleges (A)	1994	22.4	12.6	17.4	13.8	18.7	13.5	0.8	0.7
	2005	15.7	11.8	17.0	17.7	17.4	19.2	0.5	0.6
Colleges (B)*	1994	0.8	18.9	0.1	14.0	30.0	33.2	1.6	1.3
	2005	2.9	17.8	3.3	18.4	18.2	37.7	0.8	0.8
Colleges (C)*	1994	3.3	27.1	5.9	19.4	19.4	21.3	1.2	2.4
	2005	5.9	18.6	7.3	19.7	12.6	31.6	0.5	3.8
Colleges (D)*	1994	12.9	43.8	4.3	17.6	9.9	10.5	1.1	0.0
	2005	13.6	33.8	8.4	17.9	7.8	17.8	0.8	0.0

*** See notes in table 1**

The results in table 7 show that from 1994 to 2005 there has been an increased tendency among students to choose the field of education of health, welfare and sports and business and administration, and a decreased tendency to choose humanities and arts and education.

5.2. The change of education structure across the higher education institutions

There are put forward hypotheses that the structure of field of education across the university and colleges should rather diverge than converge. A stronger convergence, and thus a more homogenous structure of education, is expected to favour the central regions due to the expectation that central regions will be the winners in a more homogeneous competition. A stronger regional specialisation of the field of education will probably favour the less central regions due to a more unique structure that is not that much in competition with the field of education structure at the universities and colleges in the central regions.

Table 8a.Value deviations in the field of education structure of students by categories of regions in 2005 in relation to 1994. The value deviation** is measured in percent points in relation to the field of education structure of *all students in Norway* in 1994 set at an index=100.

Categories of regions:	Humani-ties and arts	Edu-cation	Social sciences and law	Business and admini-stration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communi-cations, safety and security	Total
Norway	65.5	78.3	86.8	85.7	73.1	112.2	60.6	78.8	83.6
University and colleges	35.4	59.8	75.4	88.8	91.9	131.1	85.7	46.2	74.7
Colleges (B)*	74.6	110.1	89.2	87.7	65.9	111.2	70.1	63.3	92.0
Colleges (C)*	57.7	64.9	87.3	78.7	71.9	107.7	50.0	99.6	77.6
Colleges (D)*	93.8	72.7	89.6	109.0	88.4	148.5	61.7	52.5	88.7

* See notes in table 1. ** Controlled for the number of regions within each category of regions

Table 8b.Value deviations in the field of education structure of students by categories of regions in 2005 in relation to 1994. The value deviation** is measured in percent points in relation to the field of education structure of *all students in the capital region* in 1994 set at an index=100.

Categories of regions:	Humani-ties and arts	Edu-cation	Social sciences and law	Business and admini-stration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communi-cations, safety and security	Total
Norway	63.1	80.9	75.9	87.2	68.0	112.4	55.6	116.8	81.9
University and colleges	46.6	66.4	63.9	87.9	97.5	123.7	76.6	107.1	78.5
Colleges (B)*	70.6	119.1	80.4	92.2	63.4	111.2	64.7	82.9	91.0
Colleges (C)*	57.4	67.9	77.1	76.9	64.7	108.2	46.6	131.1	75.7
Colleges (D)*	73.4	70.1	70.0	119.6	86.3	151.8	55.6	111.6	82.7

* See notes in table 1. ** Controlled for the number of regions within each category of regions

We have made some investigations of the development of education structure across the regions. There is, as noticed in table 7a clear variation in the field of education structure across the university and college regions. By measuring the value deviation in per cent points in all university and college regions aggregated to categories of regions in the years of 1994 and 2005, the results indicate a convergence in the field of education structure towards the

national average, at just above 16 per cent (table 8a), but even stronger convergence towards the field of education structure in the capital region, at approximately 18 per cent (table 8b). The value deviations shown in tables 8a and 8b are measured so that the value deviation in 2005 is seen relatively to the value deviations in 1994 set at an index =100 for each field of education and totally. All regional categories show a convergence towards the field of education structure in the nation and especially the capital region. Amongst the college regions there are the regions where the high educated staff at the colleges represents an intermediate and high share of the total local high educated employees that experienced the strongest convergence in the field of education structure.

5.3. Field of education structure of high educated employees in regional labour markets

One important reason to establish a decentralised college system is to offer local supply to satisfy the local demand of high qualified labour. Thus it is important to look at the education structure of this local demand for to investigate if the regional colleges are able to educate the necessary type of labour.

Table 9a.Value deviation in the field of education structure of high educated employees by categories of regions in 2005 in relation to 1994. The value deviation** is measured in percent points in relation to the field of education structure of *all employees with higher education in Norway* in 1994 set at an index=100.

Categories of regions:	Humani-ties and arts	Edu-cation	Social sciences and law	Business and admini-stration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communi-cations, safety and security	Total
Norway	96.2	90.7	121.2	108.2	98.4	136.9	98.7	66.8	103.1
University and colleges	54.9	85.3	86.2	105.7	88.1	128.2	167.8	145.4	92.3
Colleges (B)*	102.5	99.0	111.9	104.0	122.8	142.0	69.2	43.5	105.8
Colleges (C)*	104.2	90.3	138.4	112.9	94.5	141.8	94.6	58.8	106.8
Colleges (D)*	92.7	86.5	139.8	105.8	93.7	114.1	124.8	115.6	98.3

* See notes in table 1. ** Controlled for the number of regions within each category of regions

Table 9b. Value deviation in the field of education structure of high educated employees by categories of regions in 2005 and 1994. The value deviation** is measured in percent points in relation to the field of education structure of *all employees with higher education in the capital region* in 1994 set at an index=100.

Category of regions:	Humani-ties and arts	Edu-cation	Social sciences and law	Business and admini-stration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communi-cations, safety and security	Total
Norway	94.1	90.1	124.1	109.8	92.7	144.9	103.2	73.3	103.9
University and colleges	96.0	93.9	94.4	106.5	81.4	130.8	164.8	188.3	101.6
Colleges (B)*	95.3	93.0	118.0	107.8	101.1	146.7	76.6	47.4	104.2
Colleges (C)*	97.2	89.2	132.0	113.6	92.6	144.6	99.8	63.6	106.0
Colleges (D)*	81.8	87.2	131.3	106.8	90.6	157.4	133.1	129.0	99.7

* See notes in table 1. ** Controlled for the number of regions within each category of regions

In the same manner we have thus made investigations of the development of education structure of employed with higher education. The results indicate a slight divergence in the field of education structure in relation to the national average (table 9a) and the capital region (table 9b). There are college regions where the high educated staff at the colleges represents a low and intermediate share of the total local high educated employees that experience a divergence in the field of education structure among employees. College regions where the high educated staff at the colleges represents a high share of the total local high educated employees experienced a weak convergence in the field of education structure of high educated employees.

To investigate how the field of education structure of students harmonizes with the field of education structure among the high educated employees, we have measured the relationship between this two fields of education structures. In table 10a this is measured for the year of 1994, while table 10b shows similar measures from 2005. The results indicate that the weakest harmony is to be found in field of education of education and health, welfare and sports. This is probably not any sensation, due to the fact that there are special colleges for these types of education fields, delivering post-graduate students to the entire national labour market. A strong harmonizing structure in primary industries is also expected, due to specialized colleges in the primary industry districts. Across regional typologies the strongest harmony between the field of education structure of students and high educated employees is to be found in regions that include both universities and colleges, while the weakest connection is to be found in college regions where the staff at the colleges represents a low share of the total local high educated employees.

In table 10c we show the relationship between the structure of value deviation in 2005 in relation to the structure of value deviation in 1994 set at an index = 100. The results indicate a stronger harmony between the field of education structure of students and high educated employees in 2005 compared to 1994. The strongest increase in harmonization is to be found in the region that include both university and colleges and in the college regions where the staff at the college represents an intermediate share of the high educated employment. The college regions where the staff at the college represents a high share of the total local high educated employment deviate from this patterns by showing a somewhat stronger disharmony between the fields of education structure among students and employees in 2005 than in 1994.

Table 10a: Value deviation in the field of education structure between students and employees with higher education by categories of regions in 1994. The value deviation** is measured by percent points.

Categories of regions:	Humanities and arts	Education	Social sciences and law	Business and admini-stration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communications, safty and security	Total
Norway	7.3	18.1	4.4	10.0	13.0	14.2	1.4	3.1	71.5
University and colleges	8.2	6.8	6.6	4.5	9.3	5.8	0.7	2.4	44.3
Colleges (B)*	7.5	28.3	3.5	11.8	18.7	27.6	1.8	3.1	102.4
Colleges (C)*	7.3	28.6	4.9	13.0	16.5	15.6	1.8	4.5	92.3
Colleges (D)*	6.2	8.5	2.7	10.8	7.4	7.6	1.4	2.5	47.2

* See notes in table 1. ** Controlled for the number of regions within each category of regions

Table10b: Value deviation in the field of education structure between students and employed with higher education by categories of regions in 2005. The value deviation** is measured by percent points.

Categories of regions:	Humanities and arts	Education	Social sciences and law	Business and administration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communications, safty and security	Total
Norway	5.1	15.6	5.1	8.4	9.6	15.3	1.0	3.1	63.2
University and colleges	4.1	3.6	6.0	5.0	8.6	4.2	0.5	2.4	34.4
Colleges (B)*	5.9	29.5	4.6	9.8	12.3	32.0	1.2	2.9	98.3
Colleges (C)*	3.8	19.6	4.9	10.9	10.6	16.3	1.2	4.4	71.7
Colleges (D)*	6.5	9.6	5.0	7.9	6.9	8.7	1.0	2.9	48.5

* See notes in table 1. ** Controlled for the number of regions within each category of regions

Table10c: Value deviation in the field of education structure between students and high educated employees by categories of regions in 2005 in relation to 1994. Index: The value deviation** in 1994 =100.

Categories of regions:	Humanities and arts	Education	Social sciences and law	Business and administration	Natural sciences, vocational and technical subjects	Health, welfare and sports	Primary industries	Transport and communications, safty and security	Total
Norway	69	86	116	84	74	108	69	100	88
University and colleges	50	54	91	111	93	72	75	100	78
Colleges (B)*	78	104	133	83	66	116	64	94	96
Colleges (C)*	52	69	99	84	65	104	67	96	78
Colleges (D)*	104	113	183	74	93	115	75	114	103

* See notes in table 1. ** Controlled for the number of regions within each category of regions

Finally, we have estimated the relationship between the field of education structure of the high educated employees, as the dependent variable, and the field of education structure of the students in the years of 1994 and 2005 respectively. Obviously, the most significant and positive parameters are to be found in the estimates for the entire nation, showing how the field of education structure of the students, wherever they may study, fits to the field of education structure among all high educated employees (see table 11). It is, however, interesting to note that the relationship is partly negative and insignificant at the national level for transport and communications, safety and security. This probably reflects an uncovered demand of ICT-specialists in the national labour marked.

As expected, the disharmony increases when we turn to the regional level. By using this kind of methods, we also notice that the most positive and significant parameters are to be found in regions that include both universities and colleges and in college regions where the high educated staff at the colleges represents an intermediate share of the local high educated employment.

Table11. The relationship between the field of education structure of high educated employees and students in 1994 and 2005. By categories of regions. Partially OLS-estimations where the field of education structure of employees is the dependent variable and the corresponding field of education structure among students represents the independent variables.

Students: **Em-ployees in categories of regions**	**Period**	**Humani-ties and arts**	**Edu-cation**	**Social sciences and law**	**Business and admini-stration**	**Natural sciences, vocational and technical subjects**	**Health, welfare and sports**	**Primary industries**	**Transport and communi-cations, safety and security**
Norway	1994	0.185*** (6.89)	0.102** (2.78)	0.233*** (8.29)	0.046* (1.98)	0.155*** (4.12)	0.093*** (3.83)	0.168*** (4.34)	-0.073 (-0.94)
	2005	0.222*** (6.89)	0.095** (2.33)	0.209*** (5.56)	0.089** (3.10)	0.257*** (5.09)	0.133*** (4.64)	0.397*** (7.39)	0.010 (0.21)
University and col-leges (A)	1994	0.308* (2.18)	0.371** (3.35)	0.354*** (9.36)	0.277 (1.80)	0.323* (1.99)	-0.128 (-0.29)	0.251** (4.23)	-0.399* (-2.03)
	2005	0.280 (0.84)	0.681** (3.81)	0.341** (3.11)	0.364 (1.86)	0.344** (2.96)	0.163 (0.29)	0.547*** (10.50)	0.065 (0.11)
Colleges (B)	1994	-0.014 (-0.05)	0.004 (0.80)	-0.421* (-2.28)	0.029 (0.74)	0.091* (1.83)	0.003 (0.21)	-0.032 (-0.34)	-0.231 (-0.75)
	2005	0.035 (0.40)	-0.001 (-0.03)	0.027 (0.59)	0.087* (1.93)	0.095 (1.12)	0.037 (1.26)	0.295*** (4.85)	-0.084 (-0.38)
Colleges (C)	1994	0.061 (0.93)	0.075** (2.45)	0.104** (2.39)	0.055* (1.89)	0.165** (3.48)	0.168*** (4.99)	0.198*** (4.30)	-0.074 (-0,79)
	2005	0.129** (2.66)	0.123** (2.89)	0.106* (1.92)	0.082** (2.39)	0.296*** (4.57)	0.209*** (5.74)	0.390*** (4.34)	0.025 (0,56)
Colleges (D)	1994	0.233*** (6.17)	0.310 (1.65)	0.238* (2.37)	0.027 (0.61)	0.549 (1.26)	0.286 (1.03)	0.311** (3.72)	--
	2005	0.236** (3.73)	0.096 (0.64)	0.105 (1.09)	0.039 (0.72)	2.071** (4.17)	0.209 (0.96)	0.552** (3.14)	--

6.1. Transitions through higher education by typologies of regions

There are put forward hypotheses that students that live and study in the most central regions complete their graduation more quickly compared to students in middle sized or peripheral regions, and thus increase the supply of high educated labour in the central regional labour markets. There are, however, reasons also to expect the opposite phenomenon, due to the facts that students in less central regions face less opportunities and temptations of alternative activities compared to students in the university cities. The central regions may to a higher extent also offer part time jobs to students that might hamper the formal progression of studies.

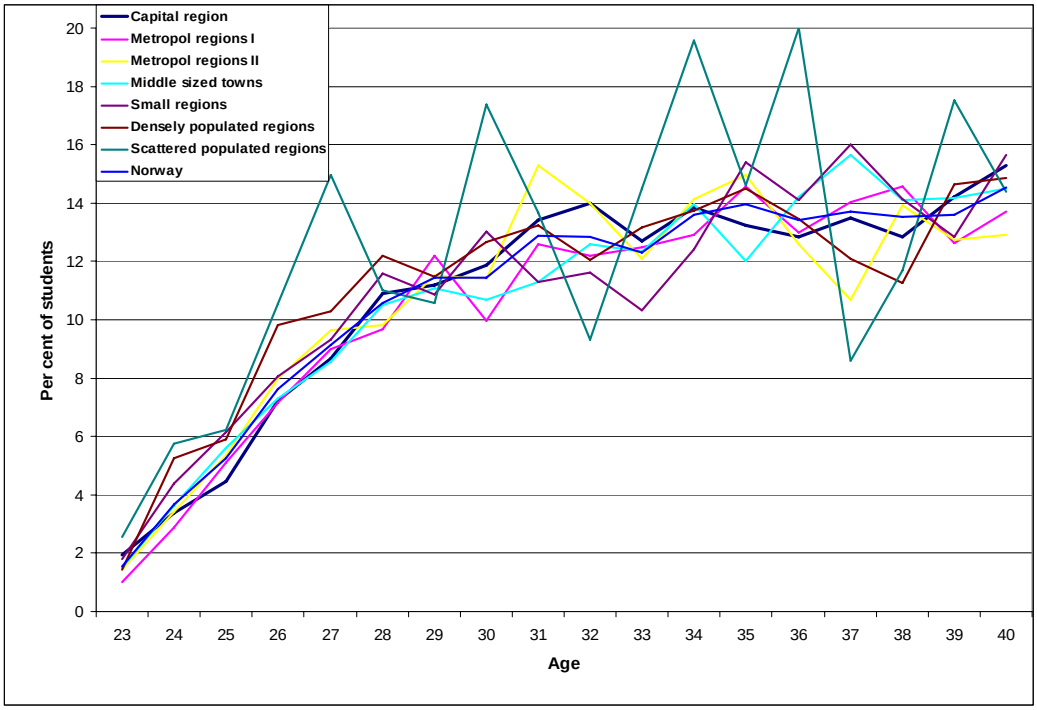
We have made some preliminary cross-sectional investigations that may illuminate some of this approach. We use panel data at a rather detailed regional level, at altogether 162 regional labour markets, further aggregated to seven regional typologies ranked by a central-peripheral division (see section 2 above).

In the first general investigation we have simply measured at which age students complete their higher education at the level of a bachelor degree. We use the entire mass of students that still not have completed the class level 17, which means the upper level of low higher

education. Then we calculate the percentages of the student mass by one year age groups that completed their class level 17.

Tentative results in figure 1 show that the rates of completion of class level 17 do not have any dominance in central regions. In the capital region the share of students that completes their lower degree of higher education is mostly below the national average up to 28 years of age, but the rates of completion turn then somewhat better. The best performing regions seems, however, to be found among the most peripheral regions.

Figure 1. The share of students that complete class level 17 by one year age-groups and typology of regions by centrality in 2005. Percent of students.



In another preliminary approach we have distributed all students in 2004 by their one year completed class levels from 14 to17 years of formal education. Then we follow all students to the end of 2005 and measure the percentage of students at each class level in 2004 that completed their education at a higher class level in 2005.

The results indicate that the rates of completion at class level 15 and 16 years are somewhat higher in middle sized towns and more peripheral regions than in the central typologies of regions, while the results become more evenly distributed with a small tendency towards higher transition rates in the central regions concerning class levels 17 and 18 years (see table 12). The main structure of the results is still present when decomposing the rates by students below and above 30 years of age. We have also made investigations of the rates of completion among students in part time jobs. The results reflect a somewhat lower rate of completion generally, but do not disturb the regional structure of the results in table 13.

Table 12. Transition rates from one class level to a higher class level among all students in higher education in the year of 2004 that attained a higher class level in 2005.Regional typologies by centrality. Index: Average transition rate at each class level at the national level is set at 100.

Class level	Capital region	Metropol region I	Metropol region II	Middle sized towns	Small regions	Densely populated regions	Scattered populated regions
Total:							
14-15	**76**	**121**	**105**	**106**	**102**	**100**	**120**
15-16	**74**	**87**	**104**	**120**	**150**	**126**	**93**
16-17	**108**	**82**	**133**	**108**	**97**	**74**	**76**
17-18	**139**	**127**	**72**	**75**	**77**	**60**	**101**
Below 30 years of age							
14-15	**76**	**116**	**105**	**105**	**111**	**107**	**69**
15-16	**72**	**92**	**99**	**115**	**147**	**130**	**90**
16-17	**115**	**87**	**133**	**94**	**94**	**87**	**64**
17-18	**137**	**99**	**75**	**91**	**84**	**65**	**115**
30-39 years of age							
14-15	**63**	**160**	**118**	**102**	**49**	**41**	**549**
15-16	**73**	**92**	**107**	**117**	**175**	**121**	**114**
16-17	**105**	**89**	**138**	**106**	**93**	**62**	**88**
17-18	**139**	**146**	**66**	**54**	**69**	**63**	**86**

Conclusions:

The findings suggest that regions that contain both university and colleges perform better than average on most indicators being analysed; especially, the ability to increase the number of high educated labour, the return to the net increase of professionals at the higher education institutions on the numbers of regional high educated labour, the ability to re-allocate jobs within firms from low to higher education jobs, higher population growth, higher than average net in-migration of population due to relatively low out-migration and stronger import of knowledge through in-migration than export of knowledge through out-migration, thus experiencing a strong regional "brain-gain".

Slettet: s

Furthermore, the regions where the higher education institute itself represents a minor part of the local high educated employment perform mostly better than those regions where the higher education institution itself represents a medium or large part of the local high educated employment. Finally, the regions without higher education institutions mostly perform worse than average on most indicators, except the ability to create new jobs in new established firms. However, these regions also show higher than average closures of firms generally.

There has been an increased tendency among students to choose the field of education of health, welfare and sports and business and administration, and a decreased tendency to choose humanities and arts and education. It is, however, observed a tendency of convergence in the field of education structure across the higher education institutions and especially towards the field of education structure at the university and colleges in the capital region.

There has been a slight divergence in the filed of education structure across regions among high educated employees. In spite of this the results indicate a stronger harmony between the fields of education structure among students and high educated employees in the higher education institution regions.

Finally, the rates of completion of studies are somewhat higher in middle sized towns and in more peripheral regions considering lower class levels of higher education, while the results become more evenly distributed with a small tendency towards higher transition rates in the central regions considering higher class levels.

References

- Hustoft, A.G., H. Hartvedt, E. Nymoen, M. Stålnacke and H. Utne (1999): *Standard for økonomiske regioner*, Reports no 6, 1999. Statistics Norway.

- NOU 1988: 28 (Official Norwegian Report no 1988: 28): *Med viten og vilje*. The Norwegian Ministry of Education and Research.

- NOU 2011: 3 (Official Norwegian Report no 2011: 3*): Kompetansearbeidsplasser – drivkraft for vekst i hele landet*. The Norwegian Ministry of Local Government and Regional Development.

- Stambøl, L.S (2008): Regional self-employment dynamics in Norway measured by labour mobility in a cross-sectional analysis. Paper presented at *the 48th Congress of the European Regional Science Association*. Liverpool, England, 27.- 31. August 2008.

- Stambøl, Lasse Sigbjørn (2009): Maintenance of and Exits from Self-Employment in Norway measured by Regional Labour Market Mobility in a Longitudinal Analysis. Paper presented at *the 49th Congress of the European Regional Science Association*. Lodz, Poland, 25.- 29. August 2009.